THAT WHICH IS CLAIMED:

1. A method of generating a second set of equations requiring reduced numbers of computations from a first set of general equations, wherein each general equation defines a coefficient in terms of a set of samples and a plurality of functions having respective values dependent upon each sample, said method comprising the steps of:

assigning a first set of tokens to the plurality of functions such that every value of the plurality of functions having a different magnitude is assigned a different token, thereby permitting each general equation to be defined by the set of samples and their associated tokens;

evaluating each of the general equations as defined by the set of samples and associated tokens and grouping the samples having the same associated token together into separate groups;

assigning a second set of tokens to represent a plurality of unique combinations of the samples; and

generating the second set of equations based on at least the first and second sets of tokens.

2. A method according to Claim 1 further comprising after said assigning a second set of tokens step the step of assigning an nth set of tokens to represent a plurality of unique combinations of the (n-1)th set of tokens, and wherein said generating step comprises generating the second set of equations based on at least the first through the nth sets of tokens.

3. A method according to Claim 1 wherein the general equation defines a discrete Fourier transform, and wherein said generating step generates a second set of equations that define a discrete Fourier transform.

4. A method according to Claim 1 wherein the general equation defines a discrete cosine transform, and wherein said generating step generates a second set of equations that define a discrete cosine transform.

5. A method according to Claim 1 wherein the general equation defines a function selected from the group consisting of Fourier transform, two-dimensional Fourier transform, cosine transform, two-dimensional cosine transform, Bessel functions, Legendre Polynomials, Tschebysheff Polynomials of First and Second Kind, Jacoby Polynomials, Generalized Laguerre Polynomials, Hermite Polynomials, Bernoulli Polynomials, Euler Polynomials, Matrices used in Quantum Mechanics, Linear Algebra and wavelets, and wherein said generating step generates a second set of equations that define the function.

6. A method according to Claim 1 wherein the method is developed using universal approximators.

7. A method according to Claim 1 further comprising the step of using the second set of equations generated in said generating step to determine the coefficients based on a set of samples.

8. An apparatus for generating a second set of equations requiring reduced numbers of computations from a first set of general equations, wherein each general equation defines a coefficient in terms of a set of samples and a plurality of functions having respective values dependent upon each sample, said apparatus comprising a processor capable of performing the following functions:

assigning a first set of tokens to the plurality of functions such that every value of the plurality of functions having a different magnitude is assigned a different token, thereby permitting each general equation to be defined by the set of samples and their associated tokens;

evaluating each of the general equations as defined by the set of samples and associated tokens and grouping the samples having the same associated token together into separate groups;

assigning a second set of tokens to represent a plurality of unique combinations of samples; and

generating the second set of equations based on at least the first and second sets of tokens.

9. An apparatus according to Claim 8 wherein said processor is further capable of after assigning a second set of tokens, assigning an nth set of tokens to represent a plurality of unique combinations of the (n-1)th set of tokens and generating the second set of equations based on at least the first through the nth sets of tokens.

10. An apparatus according to Claim 8 wherein the general equation defines a discrete Fourier transform, and wherein said processor is capable of generating a second set of equations that define a discrete Fourier transform.

11. An apparatus according to Claim 8 wherein the general equation defines a discrete cosine transform, and wherein said processor is capable of generating a second set of equations that define a discrete cosine transform.

12. An apparatus according to Claim 8 wherein said processor is further capable of using the second set of equations generated in said generating step to determine the coefficients based on a set of samples.

13. A computer program product for generating a second set of equations requiring reduced numbers of computations from a first set of general equations, wherein each general equation defines a coefficient in terms of a set of samples and a plurality of functions having respective values dependent upon each sample, wherein the computer program product comprises:

a computer readable storage medium having computer readable program code means embodied in said medium, said computer-readable program code means comprising:

first computer instruction means for assigning a first set of tokens to the plurality of functions such that every value of the plurality of functions having a different magnitude is assigned a different token, thereby permitting each general equation to be defined by the set of samples and their associated tokens;

second computer instruction means for evaluating each of the general equations as defined by the set of samples and associated tokens and grouping the samples having the same associated token together into separate groups;

third computer instruction means for assigning a second set of tokens to represent a plurality of unique combinations of samples; and

fourth computer instruction means for generating the second set of equations based on at least the first and second sets of tokens.

14. A computer program product according to Claim 13 comprising after said third computer instruction means, fifth computer instruction means for assigning an nth set of tokens to represent a plurality of unique combinations of the (n-1)th set of tokens, and wherein said fourth computer instruction means generates the second set of equations based on at least the first through the nth sets of tokens.

15. A computer program product according to Claim 13 wherein the general equation defines a discrete Fourier transform, and wherein said fourth computer instruction means generates a second set of equations that define a discrete Fourier transform.

16. A computer program product according to Claim 13 wherein the general equation defines a discrete cosine transform, and wherein said fourth computer instruction means generates a second set of equations that define a discrete cosine transform.

17. A computer program product according to Claim 13 further comprising fifth computer instruction means for using the second set of equations generated in said generating step to determine the coefficients based on a set of samples.

18. A method of generating a second set of equations requiring reduced numbers of computations from a first set of general equations, wherein each general equation defines a coefficient in terms of a set of samples having individual sample numbers and a plurality of functions having respective function values dependent upon each sample such that the contribution of each sample to each coefficient is based on the sample and the function value associated with each coefficient, said method comprising the steps of:

generating an array of function values to be multiplied by each sample to produce contributions of each sample to each coefficient, wherein each row of the array sums to a

coefficient, each column of the array represents the function associated with each sample that contributes to each coefficient, so that a cross-point of each row and each column provides the function value associated with each sample to obtain a contribution of the sample to the coefficient such that the sum of the function values in each row provides one coefficient;

assigning a first set of tokens to the plurality of function values such that every function value having a different magnitude is assigned a different token;

obtaining the contributions of each sample to each coefficient by multiplying the sample number of each sample and the function associated with each coefficient;

for each coefficient, grouping the sample numbers multiplied to the function value associated with the coefficient that have the same associated token into separate groups;

reducing the number of mathematical terms in each group by assigning a second set of tokens to represent a plurality of unique combinations of sample numbers in the groups; and

generating the second set of equations based on at least the first and second sets of tokens.

19. A method according to Claim 18 further comprising after said reducing step the step of assigning an nth set of tokens to represent a plurality of unique combinations of the (n-1)th set of tokens, and wherein said generating step comprises generating the second set of equations based on at least the first through the nth sets of tokens.

20. A method according to Claim 18 wherein the general equation defines a function selected from the group consisting of Fourier transform, two-dimensional Fourier transform, cosine transform, two-dimensional cosine transform, Bessel functions, Legendre Polynomials, Tschebysheff Polynomials of First and Second Kind, Jacoby Polynomials, Generalized Laguerre Polynomials, Hermite Polynomials, Bernoulli Polynomials, Euler Polynomials, Matrices used in Quantum Mechanics, Linear Algebra and wavelets, and wherein said generating step generates a second set of equations that define the function.

21. A method of generating a second set of equations from a first set of equations that relates a set of input values to coefficients based on function values associated with each input value and coefficient, wherein the second set of equations requires a reduced number of computations:

evaluating the equations for each coefficient in the first set of equations in terms of the function values and associated input values;

assigning a first set of tokens to each unique function value;

multiplying a sample number associated with each input value indicating the position of each input value in the set of input values and the function associated with each coefficient;

grouping the sample numbers having the same associated token into groups;

reducing the number of mathematical terms in each group by assigning a second set of tokens to represent a plurality of unique combinations of sample numbers in the groups; and

generating the second set of equations based on at least the first and second sets of tokens.

22. A method of generating a second set of equations requiring reduced numbers of computations from a first set of general equations, wherein each general equation defines a coefficient in terms of a set of samples each having a symbolic input number and a plurality of functions having respective values dependent upon each sample, the method comprising the steps of:

representing a coefficient equation for each coefficient symbolically in the first set of equations;

evaluating the function values for the coefficient equations to obtain the coefficients in terms of the symbolic input numbers of the samples and the function values;

treating the coefficient equations as a simultaneous set;

assigning a token to each different function value;

sorting the symbolic input numbers associated with each token within the coefficient equations into groups and assigning a new token to each different group;

assigning a new token to each different group of tokens that is used;

applying values associated with the tokens to produce a symbolic formula of each coefficient;

assigning a new token to each different group and coefficient; and

generating the equations of the coefficients in terms of the token values.

23. A method according to Claim 22 further comprising the step of using the second set of equations generated in said generating step to determine the coefficients based on a set of samples.